Emission and Air Quality Trends Review 1999-2011

Idaho

July 2013

Project Objective

- To develop and present publicly available information on trends in emissions and ambient air quality in the U.S. since 1999 in easy to understand visual and tabular formats

Emission Trends

- Study Team collected and processed U.S. EPA emission inventories for years within the study period of interest (1999-2011)

- By pollutant and source category
  - electric utility coal fuel combustion
  - mobile sources
  - industrial fuel combustion & industrial processes
  - all other

Emissions Data Summary

- Data Obtained from EPA National Emission Inventory (NEI) and Trends Websites
  - EPA's Trends reports and emission comparisons include interpolations of all categories between key years (1999, 2002, 2005, 2008, 2011) at county-pollutant level
  - Represented Pollutants: VOC, NOx, SO_2, and $PM_{2.5}$
- Project Improvement
  - The Study Team augmented above data with year specific CEM emissions (2002 through 2011)

Emission Changes

- The following slides also include the tonnage-based emissions change from 1999 to 2011 for each pollutant

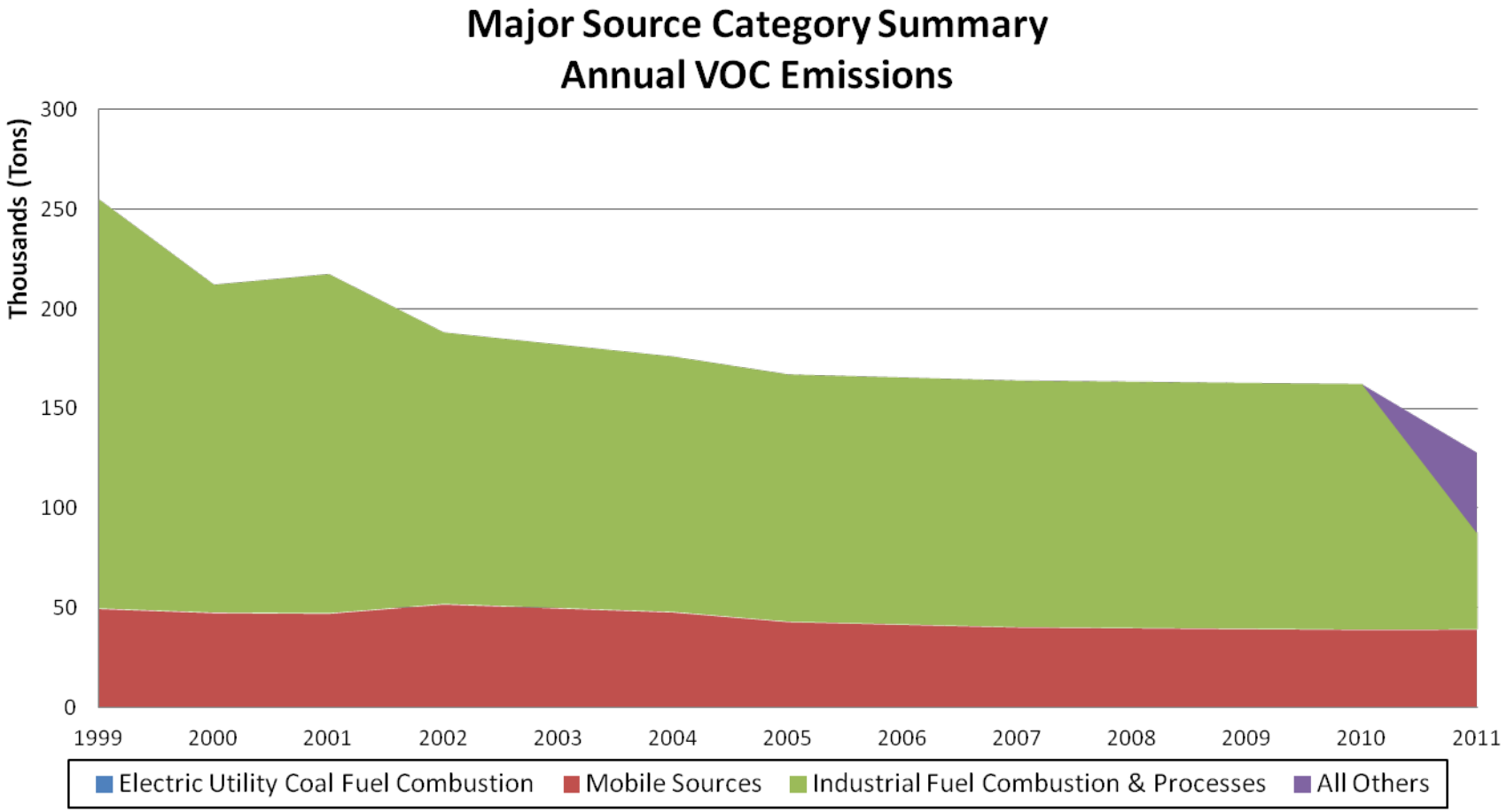
- Negative values indicate decrease in emissions, positive values indicate an increase

Idaho Emission Trends (VOC)

	Annual Emissions (Tons)									
Source Category	**1999**	**2001**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Electric Utility Coal Fuel Combustion	1	1	0	0	0	0	0	0	0	0
Mobile Sources	49,561	47,141	49,799	42,915	41,533	40,151	39,756	39,341	38,925	39,054
Industrial Fuel Combustion & Processes	205,271	170,273	132,238	124,097	123,930	123,762	123,595	123,428	123,261	48,583
All Others	24	27	4	11	11	13	14	13	13	40,351
Total	**254,858**	**217,442**	**182,041**	**167,023**	**165,473**	**163,926**	**163,365**	**162,782**	**162,199**	**127,988**

	Annual Emissions Change (Percent since 1999)									
Source Category	**1999**	**2001**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Electric Utility Coal Fuel Combustion	0%	5%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%
Mobile Sources	0%	-5%	0%	-13%	-16%	-19%	-20%	-21%	-21%	-21%
Industrial Fuel Combustion & Processes	0%	-17%	-36%	-40%	-40%	-40%	-40%	-40%	-40%	-76%
All Others	0%	9%	-82%	-53%	-56%	-46%	-44%	-46%	-45%	165682%
Total	**0%**	**-15%**	**-29%**	**-34%**	**-35%**	**-36%**	**-36%**	**-36%**	**-36%**	**-50%**

Idaho Emission Trends (VOC)

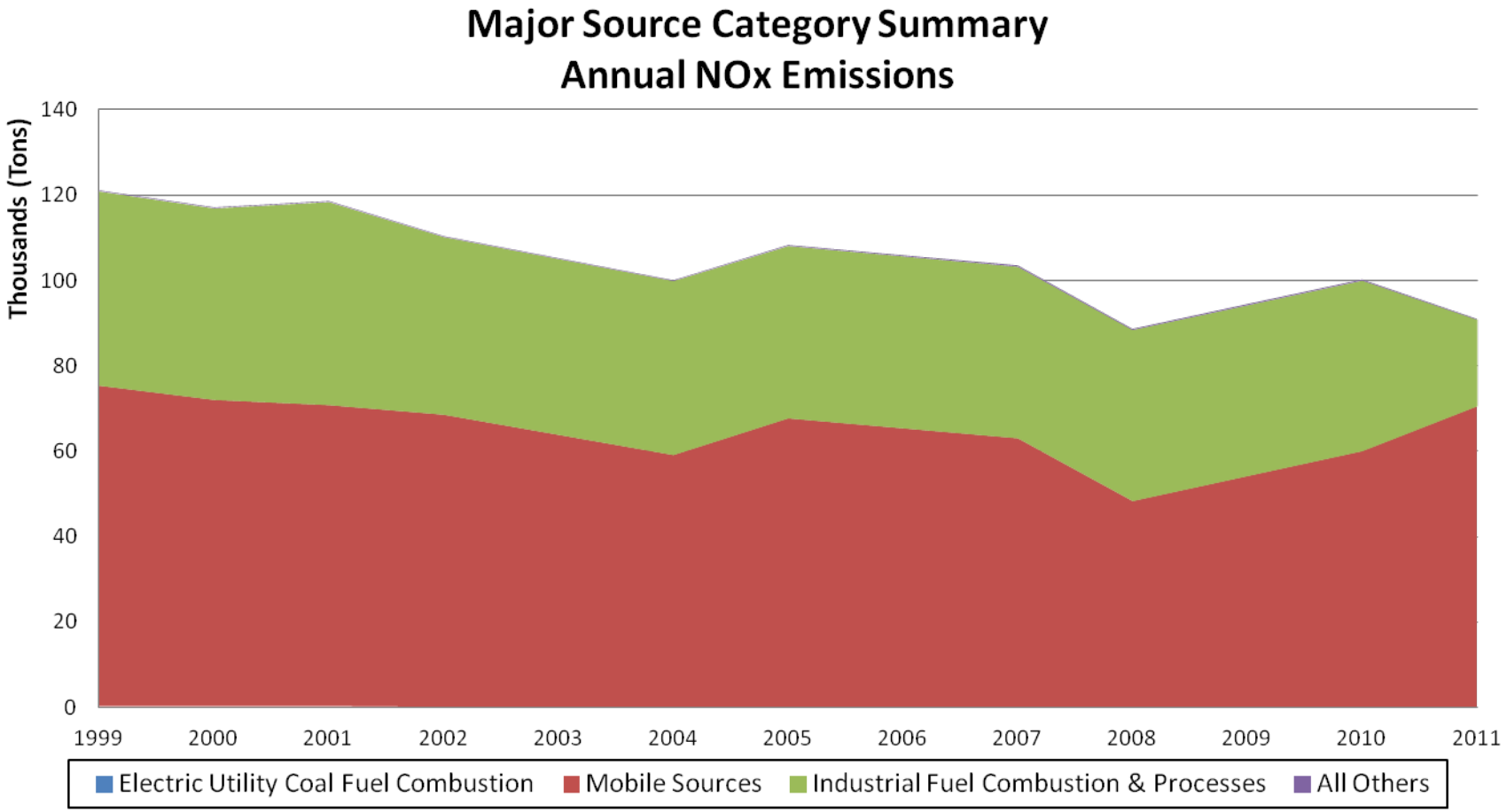


Idaho Emission Trends (NOx)

	Annual Emissions (Tons)									
Source Category	**1999**	**2001**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Electric Utility Coal Fuel Combustion	167	175	0	0	0	0	0	0	0	0
Mobile Sources	75,169	70,605	63,813	67,684	65,347	63,009	48,293	54,149	60,006	70,516
Industrial Fuel Combustion & Processes	45,515	47,590	41,229	40,378	40,297	40,216	40,135	40,054	39,973	20,343
All Others	157	170	145	213	224	293	257	270	239	157
Total	**121,008**	**118,540**	**105,186**	**108,275**	**105,868**	**103,519**	**88,685**	**94,474**	**100,218**	**91,016**

	Annual Emissions Change (Percent since 1999)									
Source Category	**1999**	**2001**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Electric Utility Coal Fuel Combustion	0%	5%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%
Mobile Sources	0%	-6%	-15%	-10%	-13%	-16%	-36%	-28%	-20%	-6%
Industrial Fuel Combustion & Processes	0%	5%	-9%	-11%	-11%	-12%	-12%	-12%	-12%	-55%
All Others	0%	8%	-8%	36%	43%	87%	64%	72%	52%	0%
Total	**0%**	**-2%**	**-13%**	**-11%**	**-13%**	**-14%**	**-27%**	**-22%**	**-17%**	**-25%**

Idaho Emission Trends (NOx)

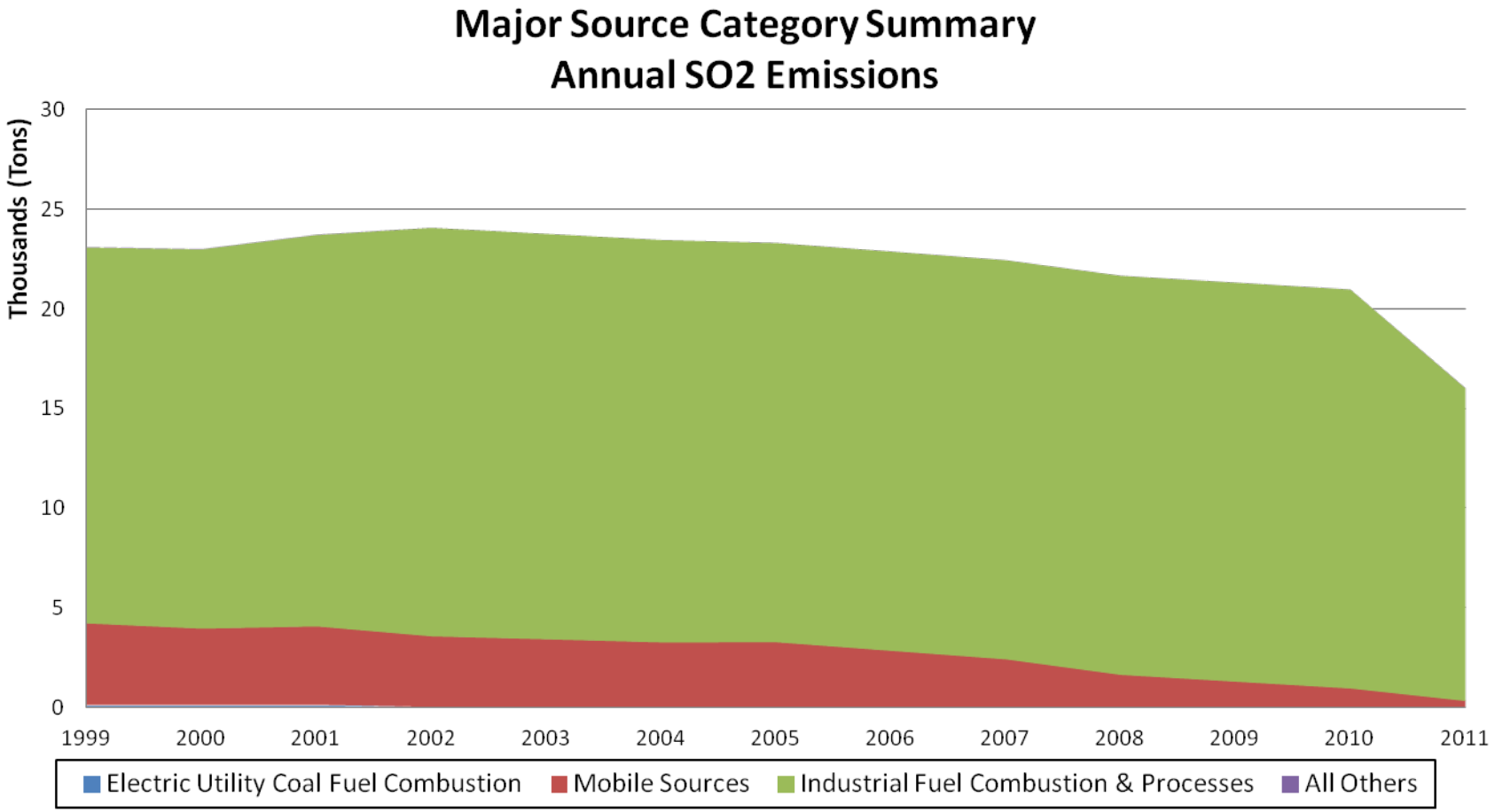


Idaho Emission Trends (SO_2)

	Annual Emissions (Tons)									
Source Category	**1999**	**2001**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Electric Utility Coal Fuel Combustion	94	98	0	0	0	0	0	0	0	0
Mobile Sources	4,124	3,970	3,420	3,274	2,845	2,416	1,637	1,295	953	327
Industrial Fuel Combustion & Processes	18,880	19,658	20,356	20,046	20,044	20,041	20,038	20,035	20,033	15,709
All Others	11	12	0	3	3	4	4	3	4	11
Total	**23,109**	**23,738**	**23,776**	**23,323**	**22,892**	**22,461**	**21,679**	**21,334**	**20,989**	**16,047**

	Annual Emissions Change (Percent since 1999)									
Source Category	**1999**	**2001**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Electric Utility Coal Fuel Combustion	0%	5%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%
Mobile Sources	0%	-4%	-17%	-21%	-31%	-41%	-60%	-69%	-77%	-92%
Industrial Fuel Combustion & Processes	0%	4%	8%	6%	6%	6%	6%	6%	6%	-17%
All Others	0%	9%	-98%	-74%	-76%	-68%	-67%	-69%	-68%	1%
Total	**0%**	**3%**	**3%**	**1%**	**-1%**	**-3%**	**-6%**	**-8%**	**-9%**	**-31%**

Idaho Emission Trends (SO_2)

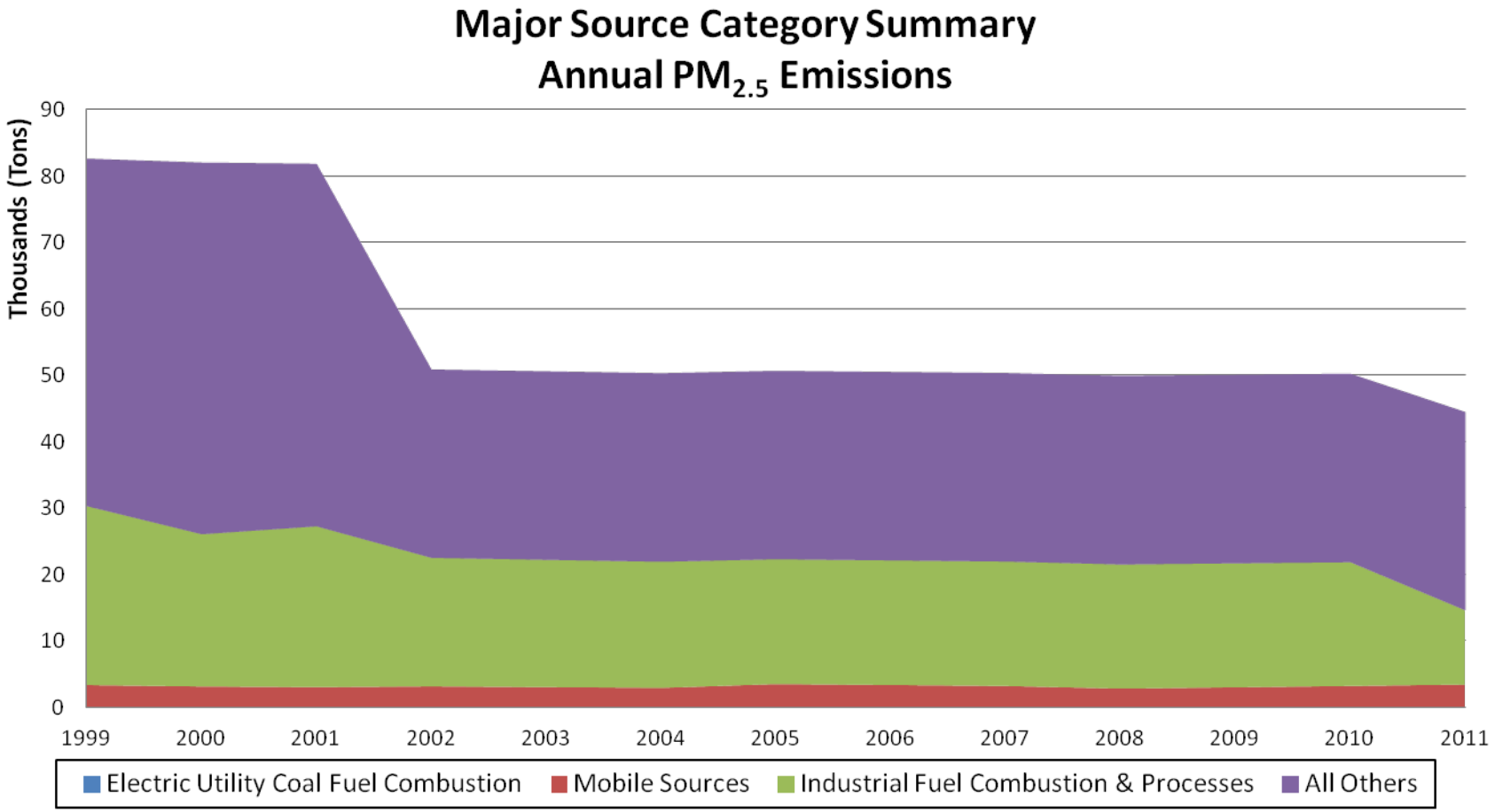


Idaho Emission Trends ($PM_{2.5}$)

	Annual Emissions (Tons)									
Source Category	**1999**	**2001**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Electric Utility Coal Fuel Combustion	18	19	0	0	0	0	0	0	0	0
Mobile Sources	3,285	2,986	3,007	3,454	3,317	3,181	2,779	2,979	3,180	3,385
Industrial Fuel Combustion & Processes	27,043	24,303	19,259	18,896	18,862	18,827	18,792	18,757	18,722	11,266
All Others	52,352	54,618	28,391	28,384	28,388	28,397	28,403	28,407	28,413	29,874
Total	**82,698**	**81,926**	**50,657**	**50,734**	**50,566**	**50,405**	**49,973**	**50,143**	**50,314**	**44,525**

	Annual Emissions Change (Percent since 1999)									
Source Category	**1999**	**2001**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Electric Utility Coal Fuel Combustion	0%	5%	-100%	-100%	-100%	-100%	-100%	-100%	-100%	-100%
Mobile Sources	0%	-9%	-8%	5%	1%	-3%	-15%	-9%	-3%	3%
Industrial Fuel Combustion & Processes	0%	-10%	-29%	-30%	-30%	-30%	-31%	-31%	-31%	-58%
All Others	0%	4%	-46%	-46%	-46%	-46%	-46%	-46%	-46%	-43%
Total	**0%**	**-1%**	**-39%**	**-39%**	**-39%**	**-39%**	**-40%**	**-39%**	**-39%**	**-46%**

Idaho Emission Trends ($PM_{2.5}$)



Emission Trends Summary

- All pollutants have decreased since 1999 in aggregate across Idaho
- Onroad emission step increase seen between 2004 and 2005 is the result of EPA's method change and MOVES model integration for estimating onroad mobile source emissions

Air Quality Design Values

- Ozone
  - Annual 4th highest daily maximum 8-hour average averaged over three consecutive years
  - Current standard = 0.075 ppm
- $PM_{2.5}$ Annual
  - Annual arithmetic mean of quarterly means averaged over three consecutive years
  - Current standard = 12 ug/m^3
- $PM_{2.5}$ 24-Hour
  - Annual 98th percentile of daily averages averaged over three consecutive years
  - Current standard = 35 ug/m^3

State-Wide Design Value (DV) Trends

- Trends in state-wide maximum DV and average DV
  - Max DV: Maximum DVs over all valid trend monitoring sites in the state in each overlapping three year period
  - Average DV: Average of DVs over all valid trend monitoring sites in the state in each overlapping three year period
- Compute linear trend via least-squares regression

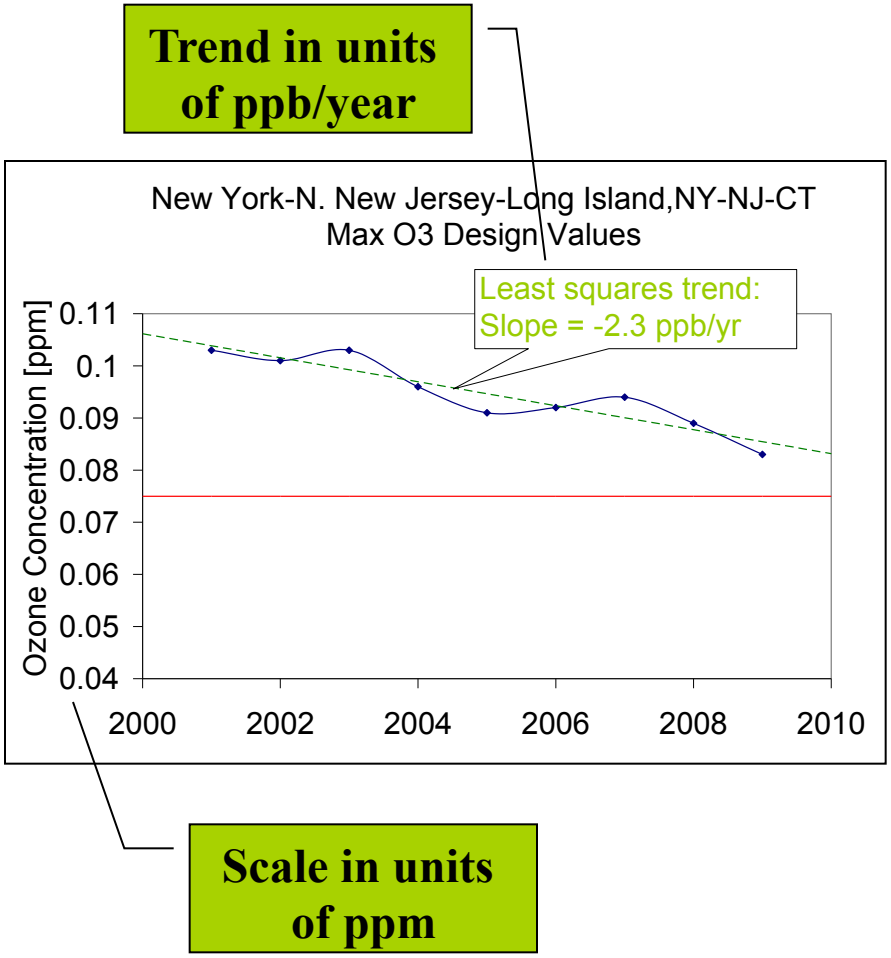
Data Handling Procedures

- O_3 design value (DV) for each overlapping three-year period starting with 1999-2001 and ending with 2009-2011
  - DV calculated using annual 4th highest daily max 8-hr averages and percent of valid observations, based on EPA data handling conventions
  - Data associated with exceptional events that have received EPA concurrence are omitted
  - Selection of trend sites require valid DV in 9 out of 11 three-year periods between 1999 and 2011
  - Identification of nonattainment areas is with respect to the 2008 8-hour standard only

Data Handling Procedures

- Annual $PM_{2.5}$ DV and 24-hr $PM_{2.5}$ DV for each overlapping three-year period starting with 1999-2001 and ending with 2009-2011
  - DV calculations based on EPA data handling conventions
  - Data extracted from monitors that have a non-regulatory monitoring type are omitted
  - Selection of trend sites require valid DV in 9 out of 11 three-year periods between 1999 and 2011

Trend Calculation

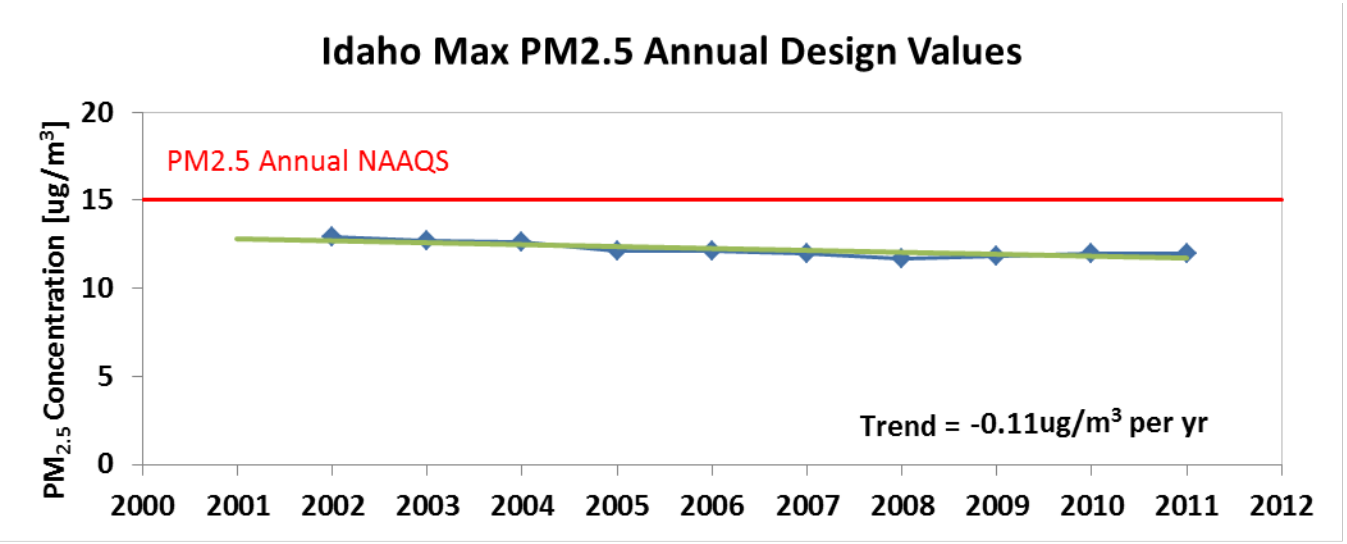


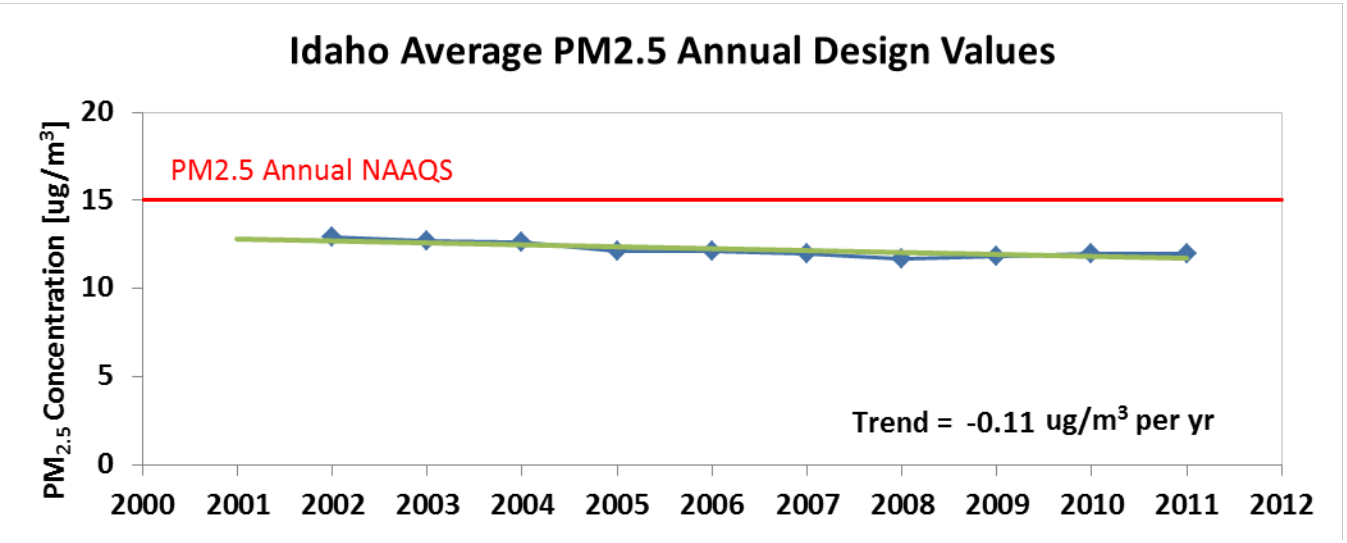
- Trends based on linear least squares fit to rolling three year design values (DVs)
- Negative trend indicates improving air quality
- DVs based on each 3-year period: 1999-2001, 2000-2002, … 2009-2011
- Notes
  - On plots, DVs are for three year period ending in year shown (i.e., 2009-2011 DV plotted as 2011 value)
  - Ozone trend values expressed as ppb/year (1,000 ppb = 1 ppm); DVs are plotted as ppm

Max/Ave O_3 DVs and Trend

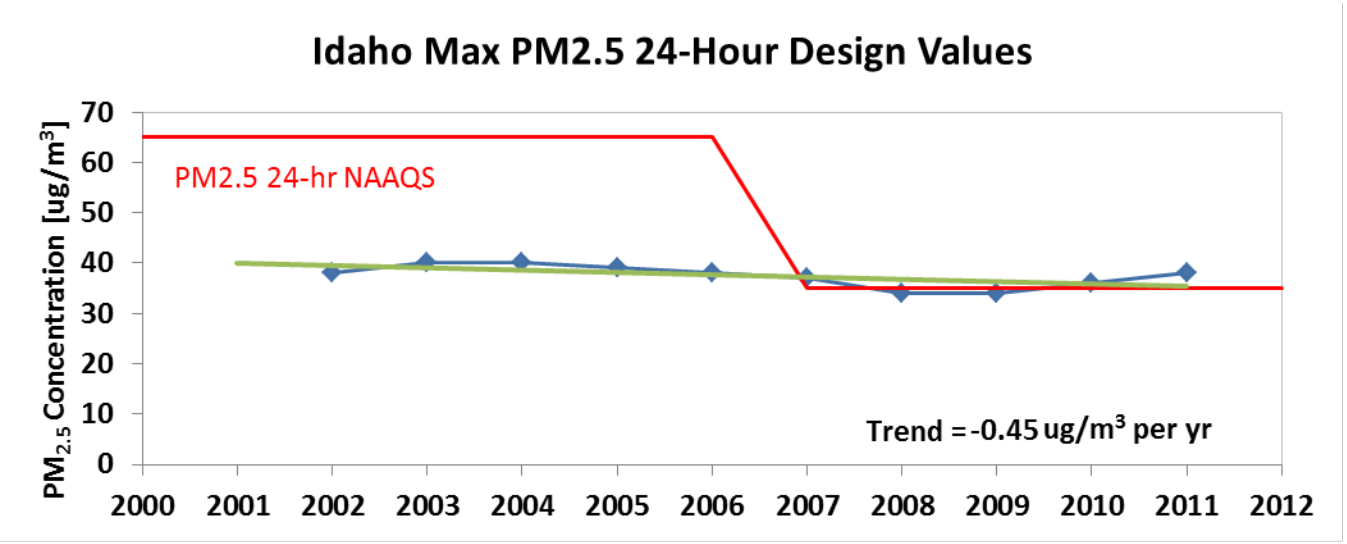
Note: No ozone monitoring sites in Idaho meet the data completeness requirements established for this analysis and therefore no trends are presented.

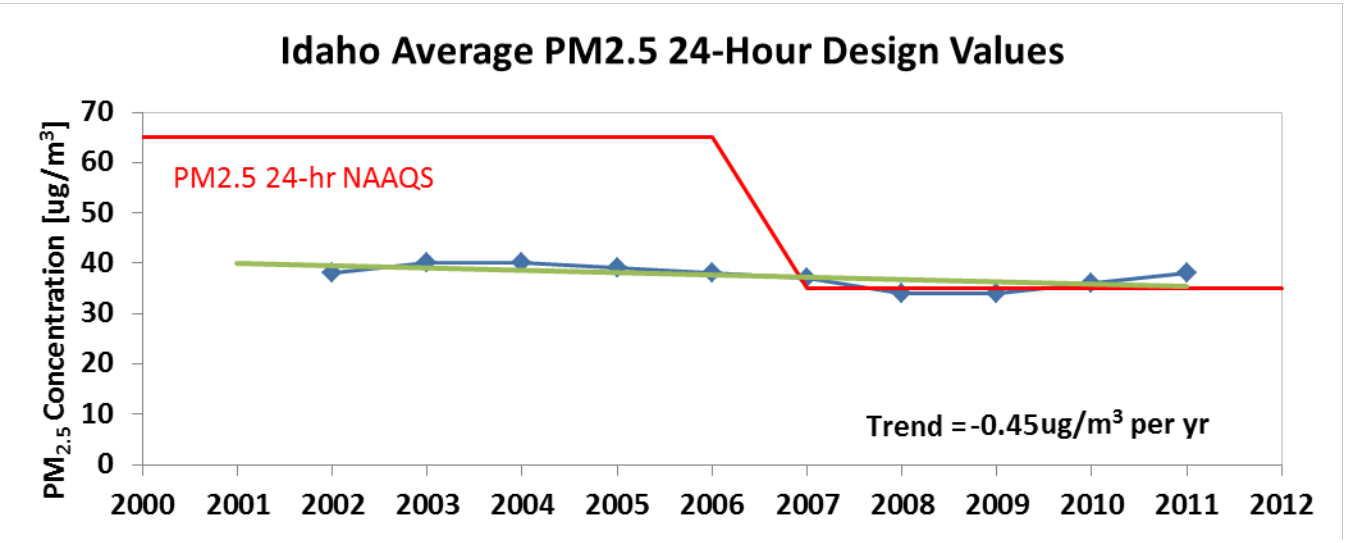
Max/Ave $PM_{2.5}$ Annual DVs and Trend





Max/Ave $PM_{2.5}$ 24-Hour DVs and Trend





$PM_{2.5}$ Trends by Site in Idaho

		2009-2011 DV [ug/m³]		Trend [ug/m³ per year]	
Monitoring Site	**County**	**Annual**	**24-Hr**	**Annual DV**	**24-Hr DV**
160790017	Shoshone	12.0	38	-0.11	-0.45

Note: Only monitoring sites meeting data completeness criteria listed

Air Quality Trends Summary

- Based on one monitoring site meeting the data completeness requirement, average annual $PM_{2.5}$ design values have remained steady since 2000 in Idaho, and average 24-hr $PM_{2.5}$ design values have decreased slightly since 2000 (incomplete data in 1999)

- There are no currently designated O_3 non-attainment areas in Idaho; 24-hr $PM_{2.5}$ design values have decreased since 2000 at the Logan, UT-ID non-attainment area, the only currently designated $PM_{2.5}$ non-attainment area in Idaho